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ABSTRACT

Terry High School is one of three schools in the Lamar Consolidated Independent School District, Texas, serving students in grades 9 through 12. Because of low student achievement on the Texas Assessment of Academic Skills (TAAS), the faculty and administration selected PLATO Learning, Inc. computer assisted instruction programs as the primary instructional supplement for a TAAS tutorial program focusing on mathematics and language arts. In 2001 alone, more than 300 students participated in PLATO instruction. In 1996, only 56% of students attending Terry High School (enrollment of more than 2,100) received passing scores on the TAAS, with lower achievement by minority students. Over the 5-year implementation of the tutorial program, the percentage of students passing all portions of the TAAS has increased dramatically. From 1996 to 1974, the percentage of students passing all portions of the TAAS improved to 76.4%, with results particularly strong in mathematics and for African American and Hispanic students. (SLD)

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Evaluation Series

Terry High School
Lamar Consolidated ISD, Rosenberg, TX

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Executive Summary

Terry High School, located in Rosenberg, Texas, is one of three schools in the Lamar Consolidated ISD serving grades 9-12. With an enrollment of over 2,100 students, Terry is the largest high school in the district. Terry also has a widely diverse student body, with over 47% Hispanic, 41% white, and 11% African American. State data also shows that over 35% of students attending Terry High School are classified as economically disadvantaged.

In 1996, only 56% of students attending Terry High School received passing scores on the Texas Assessment of Academic Skills (TAAS). The data were even lower for minority students, with only 32% of African American students and 40% of Hispanic students successfully passing the TAAS. Based on these data, the faculty and administration at Terry implemented a TAAS tutorial program during the school day. PLATO was selected as the primary technology assisted instructional supplement for these courses. The tutorial program focused on mathematics and language arts. PLATO mathematics curricula used in the program included: Math Fundamentals, Pre-Algebra, and Geometry. PLATO language arts curricula used in the program included: Reading 1, Reading 2, FASTRACK Language Arts, and Essay Writing.

Over the five-year implementation of the TAAS tutorial program, the percentage of students passing all portions of the TAAS has dramatically increased. From 1996 to 2001, the percentage of students passing all TAAS tests improved from 56.5% to 76.4%, an increase of nearly 20 percentage points. Results for TAAS math were particularly strong. Additional analysis of ethnicity showed particularly strong gains for Afro-American and Hispanic students.

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Introduction

Terry High School, located in Rosenberg, Texas, is one of three schools in the Lamar Consolidated ISD serving grades 9-12. With an enrollment of over 2,100 students, Terry is the largest high school in the district (Lamar Consolidated ISD, 2002). Terry also has a widely diverse student body, with over 47% Hispanic, 41% white, and 11% African American. State data also shows that over 35% of students attending Terry High School are classified as economically disadvantaged (Texas Education Association, 2002).

At the end of the 1995-1996 school year, only 56% of students attending Terry High School received passing scores on the Texas Assessment of Academic Skills (TAAS). The data were even lower for minority students, with only 32% of African American students and 40% of Hispanic students successfully passing the TAAS. Based on these data, the faculty and administration at Terry designed and implemented a TAAS tutorial program during the school day that involved significant use of the PLATO mathematics and reading computer-assisted instructional software. This program was initially implemented at the beginning of the 1996-1997 school year.

This report will provide a detailed account of student usage of PLATO software for TAAS remediation during the 2000-2001 school year. In addition, the report will detail changes in TAAS scores at Terry High School from 1996 until 2001, the most recent TAAS data available at the time this report was completed.

Program Description

Prior to 1996, data from the state of Texas indicated that nearly 50% of students attending Terry High School were unable to meet the minimum skills required to receive passing scores on the Texas Assessment of Academic Skills (TAAS). Because of this, Terry faculty and curriculum staff decided to implement a TAAS tutorial program during the school day (Lamar Consolidated ISD, 2002). The implementation of the program was fairly simple. Students were identified by their teachers as deficient in one or more academic areas (mathematics, reading, or writing). These students were offered opportunities to obtain "credit recovery" (i.e., extra credit points or enrichment points) based on the amount of time they spent completing remediation activities, and their performance on the remediation activities.

PLATO was selected as the primary technology assisted instructional supplement for this program. Terry High School faculty had been utilizing PLATO for three years prior to the 1996-1997 school year, and were enthusiastic about expanding the use of PLATO to assist with TAAS remediation. The tutorial program focused on mathematics and language arts. PLATO mathematics curricula used in the program included: Math Fundamentals, Pre-Algebra, and Geometry. PLATO language arts curricula used in the program included: Reading 1, Reading 2, FASTRACK Language Arts, and Essay Writing.

Students participating in the tutorial program used the PLATO software one to two times per week. Teachers accompanied their students to the lab and provided one-on-one support, monitored student progress, and utilized student reports to modify students' activities and disseminate information regarding students' progress. Support in using the

PLATO materials was provided to the teachers via a school lab manager, and through support directly from PLATO (e.g., the PLATO hotline, email tech support, software updates, and the PLATO newsletter).

Administrative leadership at Terry was extremely supportive of the tutorial program. As Ruben Vasquez, lab manager for the school stated, "I cannot begin to explain the type of support that our building principal had for the program…he planted the seed." He continued to describe the positive influence made by the building principal, stating, "…if we lacked something or needed something for our program, he provided [it]…That is one of our main reasons that we have been successful."

During the 2000-2001 school year, over 20 sections of TAAS language arts and/or mathematics classes were offered to students, with over 300 students participating in the classes (248 students utilized the PLATO mathematics curriculum, and 128 students utilized the PLATO language arts curriculum). Classes were offered during periods one through seven. No other TAAS tutorial program was offered to students at Terry High School.

Data Analysis

Fastrack grade equivalencies. Math and language arts data from the 2000-2001 school year were collected for 313 students (248 students utilized the PLATO mathematics curriculum; 128 students utilized the PLATO language arts curriculum). Table 1 provides a summary of initial and current *Fastrack* grade equivalencies[1] for students in mathematics and language arts. Figure 1 presents these data in graphical form:

Table 1. Changes in *Fastrack* grade equivalencies in math and language arts during the 2000-2001 school year.

Content Area	N	Initial Grade		Ending Grade		Change
		M	SD	M	SD	
Mathematics	248	5.33	1.20	7.52	1.42	+ 2.19
Language Arts	128	3.58	2.11	6.81	3.05	+ 3.23

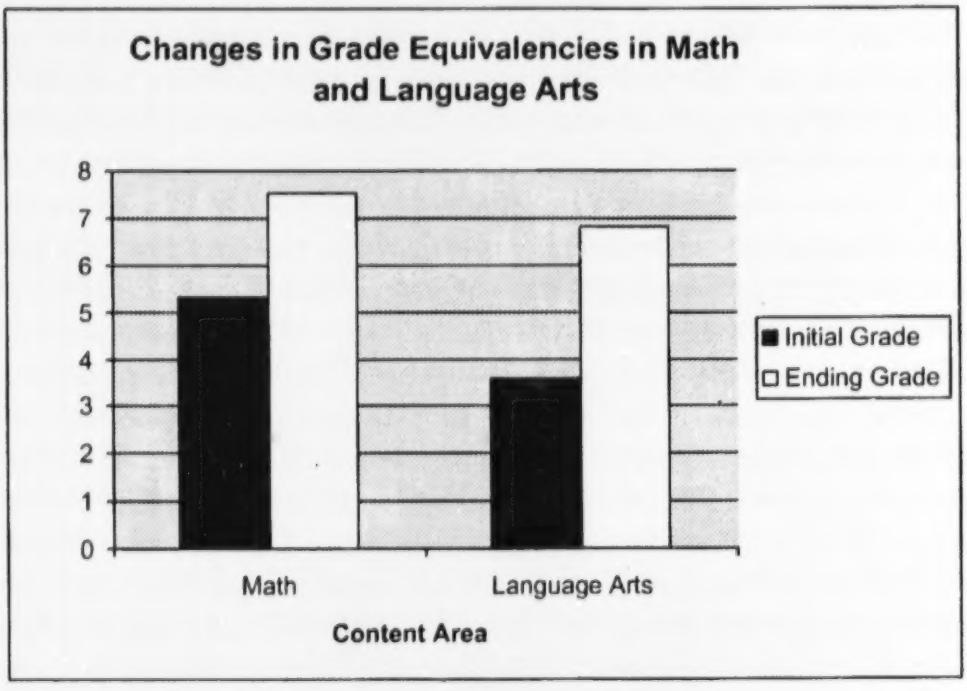
Paired-sample t-tests were conducted on the initial and ending grade data to determine if students demonstrated significant improvements in their grade equivalencies from Fall 2000 to Spring 2001. Analysis of grades in mathematics indicated that the mean grade at the end of the TAAS program ($M = 7.52$, $SD = 1.42$) was significantly greater than the mean grade at the beginning of the TAAS program ($M = 5.33$, $SD = 1.20$), $t(247) = 29.94$, $p < .001$[2]. The effect size (η^2)[3] was 0.78, a strong value (Green,

[1] *Fastrack* is a tailored testing system in PLATO which is recommended only for use as a placement test. Its grade level reports are a competency-based index which relates to the PLATO curriculum structure; correspondence with norm-referenced grade levels cannot be established.

[2] The *significance level* (or p-value) is the probability that an experimental finding is due to chance (Elmes, Kantowitz, & Roediger, 1989). In this case, $p < .001$ indicates that there is less than a one-in-one-thousand chance that the differences reported are due purely to chance.

Salkind, & Akey, 2000). Analysis of grades in language arts revealed similar results. The mean language arts grade at the end of the TAAS program ($\underline{M}$ = 6.81, $\underline{SD}$ = 3.05) was significantly greater than the mean grade at the beginning of the TAAS program ($\underline{M}$ = 3.58, $\underline{SD}$ = 2.11), $\underline{t}(127) = 15.09$, $\underline{p} < .001$. The effect size (η^2) was 0.64, a moderate value (Green, Salkind, & Akey, 2000).

Figure 1. Changes in *Fastrack* grade equivalencies in math and language arts.



Grade equivalency data demonstrated that students using PLATO in the TAAS tutorial program attained marked gains in both mathematics and language arts. In

[3] *Effect size* (or η^2) is the name given to a variety of indices that report the magnitude of a treatment effect, independent of the sample size (Becker, 2002). In general, larger effect sizes indicate that the treatment in an experiment was more effective. In this case, an effect size of 0.7 and higher would indicate a strong treatment, and an effect size of 0.4 to 0.7 would indicate a moderately strong treatment.

mathematics, students attained an average gain of over two grade levels, improving from just over fifth-grade level to above the seventh-grade level. In language arts, students posted even greater gains, improving an average of over three grade levels (from third-grade level to just under the seventh-grade level).

Sessions completed and time-on-task. Table 2 provides a summary of sessions completed by students, and the total time students were engaged with the lessons:

Table 2. Total sessions and time-on-task for students.

Data Source	N	Mean Score	SD
Number of Sessions	313	24.74	16.24
Time-on-Task (HH:MM:SS)	313	16:27:33	9:52:51

These data demonstrate that students participating in the TAAS tutorial program spent an average of over sixteen hours and participated in an average of nearly 25 sessions during the 2000-2001 school year. However, both time-on-task and number of sessions varied widely between students. Students' time-on-task ranged from a low of 36:28 to a high of 53:08:31. Similarly, the number of sessions in which students participated ranged from a low of one to a high of 113. Because the amount of time students spent using the PLATO software varied so widely, it seemed warranted to determine if there was a relationship between time-on-task and/or number of sessions completed, and the change in grade equivalent scores posted by students. Thus, Pearson correlations were calculated for time-on-task versus grade change as well as number of sessions versus grade change. Results of theses analyses are presented in Table 3.

Table 3. Pearson correlation coefficients for time-on-task and number of sessions versus *Fastrack* grade equivalents.

Content Area	N	Correlation Coefficients (r)	
		Time-on-Task	Number of Sessions
Mathematics	248	0.472**	0.376**
Language Arts	128	0.348**	0.333**

** $p < .01$

Results of these analyses revealed significant correlations in both mathematics and language arts between time-on-task and grade change, and between number of sessions completed and grade change. In other words, these results indicate that there is a significant positive relationship between the amount of time students spent engaged in the PLATO activities and the degree to which students' grade equivalencies increased from Fall 2000 to Spring 2001.

Modules mastered. Data regarding the total number of modules mastered during the 2000-2001 school year were available for only 36 students participating in the tutorial program. Table 4 provides a summary of modules mastered for these students.

Table 4. Summary of modules mastered.

Data Source	N	Mean	SD
Modules Mastered	36	204.36	108.75
Modules Not Mastered	36	527.33	218.80
Percentage Mastered	36	38.63	14.31

These data show that students mastered an average of over 200 modules during the 2000-2001 school year. However, they also failed to master an average of over 500

modules, leading to an average mastery rate of under 40%. The fairly large standard deviations for these data demonstrate that there was a wide range in modules mastered among the students. In fact, the number of modules mastered ranged from a low of four modules to a high of 548 modules!

Based on the range of data, it seemed appropriate to determine if there was an additional relationship between the number of modules mastered and the change in *Fastrack* grade equivalencies. As with previous analyses, Pearson correlations were calculated for number of modules mastered versus grade change. Results of this analysis revealed that there was a significant positive correlation between modules mastered and grade change, $r(36) = .72$, $p < .05$. In other words, this analysis demonstrates that as students completed more PLATO modules, they demonstrated a greater change in their *Fastrack* grade equivalency scores. However, module data were only available for 36 of the 313 students participating in the tutorial program.

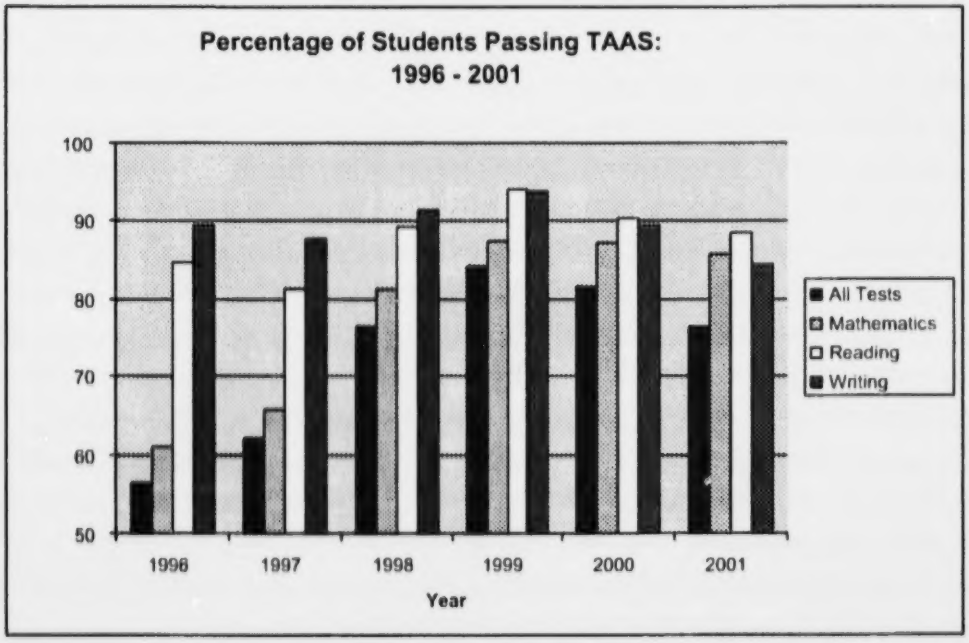
TAAS Data. TAAS results for Terry High School were acquired in order to determine any changes in these scores during the period that the TAAS tutorial program was implemented (Texas Education Association, 2002). Overall results, as well as specific results for the mathematics, reading, and writing portions of the test, are reported in Table 5. Scores are reported from 1996 (the year before the TAAS tutorial program was initiated) through 2001. Figure 2 presents these data in graphical form.

Table 5. TAAS results for students at Terry High School, 1996 - 2001.

TAAS Test	Percentage of Students Receiving Passing Scores						% Change
	1996*	1997	1998	1999	2000	2001	
All Tests Taken	56.5	62.0	76.4	84.1	81.6	76.4	+ 19.9
Mathematics	61.0	65.8	81.2	87.4	87.2	85.9	+ 24.9
Reading	84.8	81.3	89.2	94.1	90.5	88.5	+ 3.7
Writing	89.7	87.8	91.4	93.9	89.6	84.5	- 5.2

* Year before PLATO was introduced.

Figure 2. Percentage of students at Terry High School successfully passing the TAAS, 1996 – 2001.



These scores demonstrate vast improvements in the percentage of students at Terry High School successfully passing the TAAS. Over a six-year period, the percentage of students passing all TAAS tests improved from 56.5% to 76.4%, an increase of nearly 20 percentage points. The improvements are even greater in mathematics. Over the same six-year period, the percentage of students passing the mathematics portion of the TAAS

improved from 61% to 85.9%, an increase of nearly 25 percentage points. It is interesting to note that the largest number of students participating in the TAAS tutorial program during the 2000-2001 school year utilized the PLATO mathematics curriculum. Nearly 250 students used some portion of the mathematics curriculum, as opposed to only 128 students using the language arts curriculum.

TAAS test results were also acquired for students based on their ethnicity (Texas Education Association, 2002). These data are presented in Table 6. Once again, the test data are reported by overall score, as well as scores on the mathematics, reading, and writing portions of the test.

Table 6. TAAS results for students by ethnicity, 1996 - 2001.

Student Ethnicity	Percentage of Students Receiving Passing Scores						% Change
TAAS Test	1996*	1997	1998	1999	2000	2001	
African American							
All Tests	32.1	25.5	70.5	80.0	72.9	60.4	+ 28.3
Mathematics	46.4	33.3	75.0	84.0	79.2	71.1	+ 24.7
Reading	70.8	59.3	92.9	94.0	91.7	76.1	+ 5.3
Writing	80.0	74.1	93.0	96.0	84.8	75.0	- 5.0
Hispanic							
All Tests	39.8	47.2	59.9	73.6	75.3	71.8	+ 32.0
Mathematics	46.8	53.4	67.2	78.5	84.1	80.8	+ 34.0
Reading	74.5	71.3	80.9	89.4	85.4	86.1	+ 11.6
Writing	81.5	79.9	84.3	89.5	84.0	80.6	- 0.9
White							
All Tests	76.6	87.6	92.9	95.1	90.3	84.3	+ 7.7
Mathematics	76.4	87.5	95.4	96.6	92.1	93.2	+ 16.8
Reading	96.1	97.4	95.9	98.5	95.8	93.6	- 2.5
Writing	98.1	99.5	97.4	97.5	96.7	89.7	- 8.4

* Year before PLATO was introduced.

As with scores for students overall, these scores demonstrate improvements in the percentage of students at Terry High School successfully passing the TAAS. However, the improvements are even more dramatic for African-American and Hispanic students.

Over a six-year period, the percentage of African-American students passing all TAAS tests improved from 32.1% to 60.4%, an increase of over 28 percentage points. The percentage of Hispanic students successfully passing all portions of the TAAS improved from 39.8 % to 71.8%, an increase of 32 percent. Once again, the improvements appear to be greatest for the mathematics portion of the TAAS. Over the same six-year period, the percentage of African-American students passing the mathematics portion of the TAAS improved from 46.4% to 71.1%, an increase of nearly 25 percentage points. For Hispanic students, the passing rate improved from 46.8% to 80.8%, an increase of 34 percent. Once again, TAAS scores demonstrated the smallest changes for the reading and writing portions (the portions in which the lowest number of students utilized the PLATO tutorial software).

Conclusions & Discussion

Analysis of evaluation data indicates that the inclusion of PLATO computer assisted technology into the TAAS tutorial program is an important component of student success. Students demonstrated significant gains in their initial versus ending *Fastrack* grade equivalencies in both mathematics and language arts for the 2000-2001 school year, and over the five-year implementation of the TAAS tutorial program, the percentage of students passing all portions of the TAAS has dramatically increased.

Although specific data regarding the ethnicity of students participating in the TAAS tutorial classes were not available, the percentage of both African-American and Hispanic students successfully passing all portions of the TAAS (and, more specifically, the math portion of the test) increased significantly over the five-year implementation of the tutorial program. Future evaluations may wish to collect sufficient data to determine if a correlation exists between minority students' participation in tutorial programs in which PLATO software is used, and their performance on state achievement tests such as the TAAS.

Analysis of time-on-task data revealed a significant positive correlation between the amount of time students spent utilizing the PLATO curriculum and the change in grade equivalencies. These data demonstrate that increased time using the PLATO software may have a positive impact on student achievement. Additionally, it is interesting to note that the greatest increase in percentage of Terry High School students passing the TAAS occurred on the mathematics portion of the test, and PLATO mathematics curriculum was the software used by the largest number of students participating in the TAAS tutorial program.

Analysis of the limited data available regarding the number of sessions mastered by students (data were only available for 36 students) revealed a strong positive correlation between the number of modules mastered and the change in grade equivalencies. These data demonstrate that student success in mastering the PLATO curriculum may have a positive impact on student achievement.

This evaluation was completed with minimal quantitative data. Additional data for a more thorough evaluation should include student and faculty surveys and interviews, as well as long-term tracking of individual students. Several attempts were made to collect additional qualitative data with minimal success. With additional data sources, we could better determine the effectiveness of the PLATO curricula as it is implemented over multiple school years.

The results of this evaluation are preliminary in nature, but given the demonstrated positive outcomes, it is hoped that we will be able to work with Terry High School as they continue to utilize the PLATO curricula to help students improve achievement levels in mathematics and language arts.

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